

**REMARKS**

This Amendment is filed in response to the final Office Action dated December 22, 2006. For the following reasons, this amendment should be entered, the application allowed, and the case passed to issue. This amendment clearly places the application in condition for allowance and no new matter is introduced by this amendment. Support for the amendments to claims 1 and 4 is supported throughout the specification, including pages 5-17, and figures 2 and 3, which clearly disclose that the anode layer is formed from a single layer of anode material. Claims 2-5 are amended to maintain dependency. Claims 6 and 12 are amended to become dependent claims. New claims 18 and 19 are supported at page 5, lines 17-20 of the specification. Support for new claim 20 is found on page 8, lines 21-24, of the specification. The specification, at page 12, lines 16-18, supports new claim 21. Page 6, lines 10-15, of the specification provides support for new claim 22. New claim 23 is supported by the specification at page 6, lines 22 and 23. Support for new claim 24 is found in the specification at page 7, lines 3-5.

Claims 1-24 are pending in this application. Claims 1-17 are rejected. Claims 1-6 and 12 have been amended in this response. New claims 18-24 have been added in this response.

***Claim Rejections Under 35 U.S.C. § 102***

Claims 1-6, 8, 10, 12, 14 and 16 were rejected under 35 U.S.C. § 102(e) as being anticipated by Yamamoto et al. (U.S. Pat. No. 6,890,685). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the invention, as claimed, and the cited prior art.

An aspect of this invention, per claim 1, is an anode electrode for a secondary battery having a cathode and an anode for releasing and receiving the same kind of metal ion therebetween comprising an anode formed from a single layer of an anode material, the anode

material comprising boron-added carbon containing at least carbon and boron. The single layer forming the anode layer has a thickness of 30  $\mu\text{m}$  or less.

Another aspect of the invention, per claim 4, is an anode electrode for a secondary battery having a cathode and an anode for releasing and receiving the same kind of metal ion therebetween, comprising an anode layer formed from a single layer of an anode material, the anode material comprising carbonaceous material containing at least carbon. The single layer forming the anode layer has a thickness less than 1  $\mu\text{m}$ .

The Examiner asserted that Yamamoto et al. disclose an anode which has a **multi-layer** structure comprising: a first layer (2a) containing carbon as a main component; and a second layer (3a) as a main component containing a lithium-occluding material film, the film capable of occluding lithium more than a theoretical lithium-occlusion capacity for carbon. The first layer (2a) of the anode contains carbon as a main component, and has a total thickness of 5 to 1000  $\mu\text{m}$  (column 6, lines 57-58). The carbon is capable of occluding Li. Carbons disclosed by Yamamoto et al. include: graphite, fullerene, carbon nanotube, DLC, amorphous carbon, hard carbon and mixtures thereof. The carbon anode (2a) may be formed by mixing the carbon material with a conductive material such as carbon black and vapor grown carbon fiber (VGCF), a binder such as polyvinylidene fluoride and a solvent such as N-methyl-2-pyrrolidone (NMP) to give a paste, which is then applied on the current collector (1a) and dried (column 7, lines 11-23).

The second layer (3a) of the Yamamoto et al. anode contains the lithium-occluding material comprising at least one element selected from the group consisting of Si, Ge, Sn and Pb, i.e., **a material containing a group IVb element other than carbon** (column 6, lines 35-38). Further, the second layer (3a) has a total thickness of 0.1 to 500  $\mu\text{m}$  (column 6, lines 58-59).

Furthermore, the second layer (3a) may be doped with boron, phosphorous, arsenic or antimony to reduce a specific resistance (column 7, lines 53-56). Yamamoto et al. disclose Si, Ge, Sn, and Pb doped with boron, but fail to disclose carbon doped with boron. Yamamoto et al. disclose the first layer (2a) of the **multi-layered** structure contains carbon and the second layer (3a) contains boron. Yamamoto et al. do **not disclose a single layer comprising boron-added carbon**.

Yamamoto et al., further disclose that carbon is precluded from the second layer having a thickness of 0.1 to 500  $\mu\text{m}$  (col. 6, lines 35-38).

Yamamoto et al., do not anticipate the claimed anode electrode and lithium ion secondary battery because Yamamoto et al. do not disclose the anode layer formed from a **single layer** of an anode material, the anode material comprising boron-added carbon containing at least carbon and boron, and the single layer forming the anode layer has a thickness of 30  $\mu\text{m}$  or less, as required by claim 1; and do not disclose the lithium ion secondary battery wherein the anode layer is formed from a single layer of an anode material, the anode material comprising carbonaceous material containing at least carbon, and the single layer forming the anode layer has a thickness less than 1  $\mu\text{m}$ , as required by claim 4.

As shown in FIG 6 of the present application, when using the anode layer formed from a single layer of anode material which includes boron-added carbon and has a thickness of 30  $\mu\text{m}$  or less, or using the anode layer formed from a single layer of anode material which includes carbonaceous material and has a thickness less than 1  $\mu\text{m}$ , deposition of lithium metal can be prevented.

Further, as shown in FIG. 7, when using the anode layer formed from a single layer of anode material which includes boron-added carbon and has a thickness of 30  $\mu\text{m}$  or less, or using the anode layer formed from a single layer of anode material which includes carbonaceous

material and has a thickness less than 1  $\mu\text{m}$ , an averaged maintenance ratio of capacity can be increased. In fact, it is clearly evident that cycle life exceeding that of a conventional battery is obtained by using the claimed anode electrode.

The factual determination of lack of novelty under 35 U.S.C. § 102 requires the disclosure in a single reference of each element of a claimed invention. *Helifix Ltd. v. Blok-Lok Ltd.*, 208 F.3d 1339, 54 USPQ2d 1299 (Fed. Cir. 2000); *Electro Medical Systems S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994); *Hoover Group, Inc. v. Custom Metalcraft, Inc.*, 66 F.3d 399, 36 USPQ2d 1101 (Fed. Cir. 1995); *Minnesota Mining & Manufacturing Co. v. Johnson & Johnson Orthopaedics, Inc.*, 976 F.2d 1559, 24 USPQ2d 1321 (Fed. Cir. 1992); *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051 (Fed. Cir. 1987). Because Yamamoto et al. do not disclose the anode layer formed from a single layer of anode material which includes boron-added carbon and has a thickness of 30  $\mu\text{m}$  or less, as required by claim 1; and do not disclose the lithium ion secondary battery wherein the anode layer is formed from a single layer of anode material and has a thickness of less than 1  $\mu\text{m}$ , as required by claim 4, Yamamoto et al. do not anticipate claims 1 and 4.

Applicant further submits that Yamamoto et al. do not suggest the claimed anode electrode and lithium ion secondary battery.

#### ***Claim Rejections Under 35 U.S.C. § 103(a)***

Claims 7 and 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. in view of Hossain (U.S. Pat. No. 5,595,839). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The combination of Yamamoto et al. and Hossain do not suggest the claimed lithium ion secondary battery because Hossain does not cure the deficiencies of Yamamoto et al. Hossain

does not suggest the anode layer formed from a single layer of anode material which includes boron-added carbon and has a thickness of 30  $\mu\text{m}$  or less, as required by claim 1; and does not suggest the anode layer formed from a single layer of anode material having a thickness of less than 1  $\mu\text{m}$ , as required by claim 4.

Claims 9 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. in view of Izuchi et al. (U.S. Pat. No. 6,902,848). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The combination of Yamamoto et al. and Izuchi et al. do not suggest the claimed lithium ion secondary battery because Izuchi et al. do not cure the deficiencies of Yamamoto et al. Izuchi et al. do not suggest the anode layer formed from a single layer of anode material which includes boron-added carbon and has a thickness of 30  $\mu\text{m}$  or less, as required by claim 1; and does not suggest the anode layer formed from a single layer of anode material having a thickness of less than 1  $\mu\text{m}$ , as required by claim 4.

Claims 11 and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. in view of Nemoto et al. (U.S. Pat. No. 6,368,750). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The combination of Yamamoto et al. and Nemoto et al. do not suggest the claimed lithium ion secondary battery because Nemoto et al. do not cure the deficiencies of Yamamoto et al. Nemoto et al. do not suggest the anode layer formed from a single layer of anode material which includes boron-added carbon and has a thickness of 30  $\mu\text{m}$  or less, as required by claim 1; and does not suggest the anode layer formed from a single layer of anode material having a thickness of less than 1  $\mu\text{m}$ , as required by claim 4.

The dependent claims are allowable for at least the same reasons as the independent claims from which they depend and further distinguish the claimed invention.

In view of the above amendments and remarks, Applicant submits that this amendment should be entered, the application allowed, and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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